Panama - United States Commission for the Eradication and Prevention of Screwworms
COPEG

BRIEFING BOOK

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Last Review

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GLOSARY

APHIS: Animal and Plant Health Inspection Service

ARS: Agricultural Research Service

COPEG: Panama-United States Commission for the Eradication and Prevention of Screwworm

COPFA: Panama-United States Commission for Prevention of Foot and Mouth Disease

FMD: Foot and Mouth Disease

SW: Screwworm

MIDA: Ministry of Agriculture and Livestock

OIRSA: Regional International Animal Health Organization

PAHO: Pan-American Health Organization

PPME: Screwworm Sterile Fly Production Plant

SWAHRF: South West Animal Health Research Foundation

USDA: United States Department of Agriculture

COMEXA: **Mexican American Commission for Eradication of Screwworm.** Located in Tuxtla, Gutierrez, Chiapas, Mexico is the product of the bilateral agreement between Mexico and the United States. It has the responsibility to produce sterile pupaes and distribute them to different countries such as Guatemala, Honduras, El Salvador, Costa Rica, Belice, others, and at the present time to Panama and Jamaica.

Dispersal Center: Section of COPEG that received and process sterile pupaes received by air from the Sterile Insects Production Plant. Once the SW flies emerged, it is dispersed over the Permanent Prevention Barrier.

Sterile Insects Production Plant: Industrial facility located in Tuxtla, Gutierrez, Chiapas, Mexico that produces SW sterile pupaes and distributed to Mexican territory and Central American in previous years. At the present to Panama and Jamaica.

Contractor Company: Dynamic Aviation company dedicated to the aviation and in this case, particularly to the dispersion by air of SW sterile flies for which they use King Air type airplanes.

SCREWWORM INFORMATION

DATA SHEET: SCREWWORM

DESCRIPTION:
Cochliomyia hominivorax (Coquerel, 1859), the New World Cattle Screwworm (SW), is only found in warm climates throughout America. It is an obligatory parasite that feeds on healthy tissue from all warm-blooded live animals, including humans.

LIFE CYCLE:
The life cycle is approximately three weeks. The female fly mates only once during her life; the male can mate up to 10 times. The female lays multiple groups of 200 or more eggs on the edge of a wound. The larvae will emerge from the eggs in as little as 8 hours and move to the wound to feed. Larvae feed on the wound for 5 or 7 days, drop to the ground, burrow into the soil, and turn into pupae. The adult fly hatches in approximately 7 days and is ready to mate 2 days later.

PRODUCTION:
The only facility for rearing sterile flies is located in the South of Mexico, in Tuxtla Gutiérrez, Chiapas. The larvae are fed, a diet of blood, powdered egg, and a dairy substitute with a gel base, under controlled temperature and humidity levels. The current production is 100 million sterile flies per week. The total capacity of the plant is approximately 350 million per week.

STERILIZATION:
In Mexico pupae are sterilized by radiation using a source of Cesium 137, exposing the pupae to 5,500 rads. or 10x the lethal human dose. The irradiated pupae produce sterile flies which are unable to reproduce, but are normal in every other aspect.
Note: The new Plant in Panama will use X-ray to sterilize Screwworm pupae.

TRANSPORTATION:
Irradiated pupae are placed in ice chests and sent, by plane, to the Dispersal Center in Panama.
A cargo plane can carry 45 refrigerated containers, each one containing 400,000 pupae, for a delivery of approximately 20 million pupae per flight.

EMERGENCE OF FLIES:
In the Dispersal Center in Panama, pupae are placed in emergence chambers, which consists of dark, warm outer rooms, and a lighted, cold inner room. The flies that emerge are drawn to the light, move to the cold room, enter into a coma (Lethargic Fly Technique) and drop into special collection trays.

DISPERSAL:
The lethargic flies are placed in containers and transported in twin-engine planes for dispersion. One flight carries 3.6 million flies, which are dispersed on an average of 6,000 per nautical linear mile or 3,000 per nautical square mile, from an altitude of 1,500 to 8,500 feet. The sterile, infertile male mates with the fertile (wild) female, thus breaking the life cycle.

FIELD WORK:
COPEG's field inspectors visit livestock farmers to supply them with information about the Program, to collect larvae samples for identification, and to distribute free vials for collecting larvae and Curative Powder (5% Coumaphos).

COST:
The USDA annual budget for the Regional Screwworm Program is approximately US $31 million (except for 2005-27 million), of which about 5 million are spent in Panama. Annual contributions from Mexico are US $2 million and Panama is $1 million.

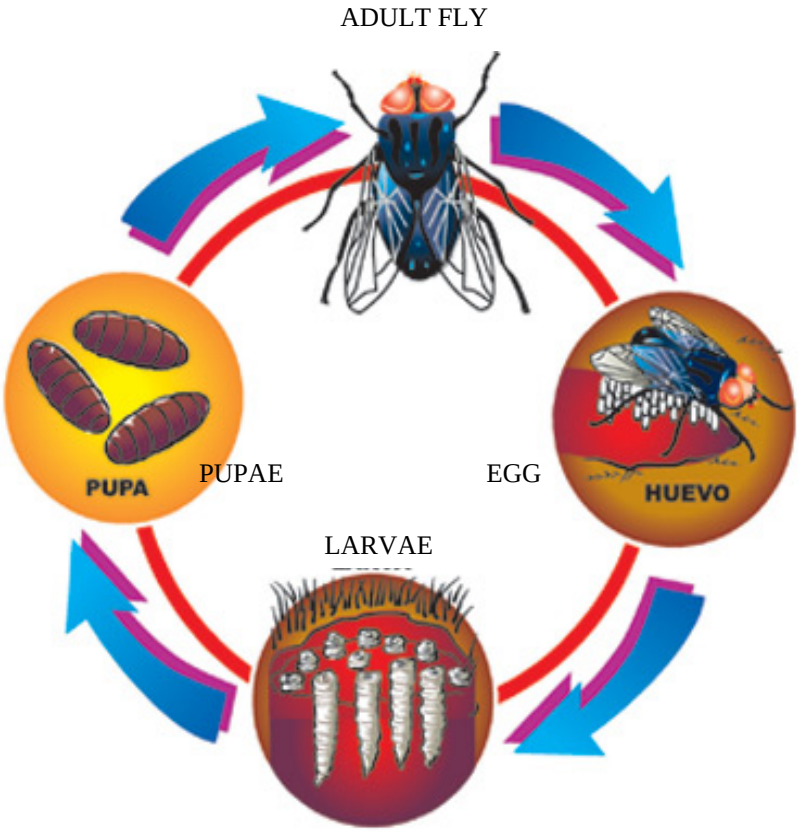
BENEFITS:
Annual Benefits for the producers: US $896 million for the United States, US $329 million for Mexico, and US $88 million for Central America. These figures can be multiplied by a constant factor of 3.5 to 7.0 to calculate the overall effect on the economy through progression and recession connections on the economy. Additionally, the benefits for consumers are calculated as the same for the overall effect on the economy.

RESULTS:
The screwworm was eradicated from the US Southeast (1959), US Southwest (1966), Mexico (1991), Belize and Guatemala (1994), El Salvador (1995), Honduras (1998), Nicaragua (1999), and Costa Rica (2000). In Panama, the Program began field activities on June 29th, 1998 and established the barrier in 2001.

SCREWWORM LIFE CYCLE

Adult Fly

The lige-cycle of the *Cochliomyia hominivorax* begins with the mating of two adult fertile flies (male and female). After a short period of time, the female fly begins searching for a fresh wound on a any type of warm-blooded animal or human, to deposit eggs. When it find the appropriate wound, the female can deposit 200 eggs or more on the edge of the wound.



PUPAE

The third-stage larvae comes out of the wound and drops to the ground and burrows into the soil where it pupates. Depending on the soil's temperature and humidity, it turns into an adult fly in 5 to 7days to begin the life cycle anew.

EGGS

The eggs incubate from 12 to 24 hours and the first group of larvae comes out of the eggs and enters the wound. Larvae feed solely on live tissue and they remain in the wound for 7 days.

LARVAE

Larvae feed in the wound for about five days. During their growth period they meld three times and gain weight.

SCREWWORM HISTORY

Introduction

The New World Screwworm

The New World screwworm, *Cochliomyia hominivorax,* is a primary parasite of warm-blooded animals. Before its eradication from North and Central America, it caused devastating losses among livestock and wild animals. In its natural state it lives only on the living flesh of mammals and birds.

The Impact of Screwworm Eradication

USDA estimates the U.S. livestock industry benefits by more than $900 million a year as a result of the eradication of the screwworm. Mexican producers and consumers saved about $2 billion from the beginning of eradication to 1991. A 1995 Texas A&M University study evaluated the direct benefit to the Central America livestock producers at $73 million a year and overall economic benefits to the region at $257 million annually. The benefits to Mexico were estimated at $275 million annually from 1991 to 1994. In addition there are the benefits of enhanced human and animal health and increased standards of living due to the removal of this deadly insect. The quality of life for smaller farmers and ranchers, especially in Central America, was improved by relief from lost man-hours needed to treat livestock and risk of loss from screwworm infestation. These benefits were made possible by the close cooperation of federal and state governments, individual producers, and producers' alliances to financially support eradication. USDA scientists, primarily from the Agricultural Research Service (ARS) and Animal and Plant Health Inspection Service (APHIS), achieved the scientific and technical advances that made eradication possible.

Theory and Research Leads to Eradication Techniques

Three scientists, Dr. Emory Cushing, Dr. Edward F. Knipling, and Dr. Raymond C. Bushland, performed the basic analyses and created the techniques underpinning the effort. Dr. Knipling & Bushland received recognition for their work by the FAO Food for Peace Award equivalent to the Nobel Peace Prize.

Species Definition

In 1933, researches of the United States Department of Agriculture (USDA) discovered that the screwworm fly, *Cochliomyia Hominivorax* (Coquerel), was a different species than the common blowfly, *Cochliomyia Macellaria,* that feeds only on the dead flesh around the edges of wounds. For over hundred years, it had been assumed that the severe losses caused by Screwworms were the result of common blowfly infestations.

Dealing With Screwworms on Ranches and Farms

Treating infested livestock was a highly unpleasant, labor-intensive job. In 1935, screwworms resulted in 180,000 livestock deaths in under half the counties in Texas, in spite of the manpower and constant effort invested in keeping the insects at bay. Endemic to the Southwest, screwworms spread to the Southeast when producers unknowingly transported infested livestock there in 1933.

Migration of the Screwworm Plague

In 1933, the screwworm migrated from the Southwest to the Southeast United States by way of a shipment of infested animals. By 1934, ranchers reported infestations in Mississippi, Alabama, North Carolina, South Carolina, Georgia, and Florida. Besieged by pleas for help, USDA and Agricultural Extension Service agents set up demonstrations and state fair exhibits to teach farmers and ranchers to prevent infestations in their livestock.

Preventing Infestation

Knipling theorized that the real solution was to prevent wound infestation by reducing or eliminating the screwworm. He developed the theory of autocide, in which sterile males would be released to overwhelm the natural population. The plan presented two problems: how to produce enough laboratory-reared screwworms and how to sterilize them in mass. By the end of the 1930s, three of four critical elements were in place

- Cushing's discovery that the screwworm is a separate species from the blowfly and breeds on live hosts,
- Bushland's technique for mass-rearing the flies, and
- Knipling's understanding of screwworm fly population dynamics and his theory for controlling the pest by the release of sterile male flies.

The last piece of the puzzle—how to sterilize mass quantities of screwworm flies—eluded Knipling and the other USDA scientists

Sterilization of Screwworms by Radiation?

In early 1950, an article by Dr. Hermann J. Muller, winner of the 1946 Nobel Prize for medicine, appeared in the *American Scientist* describing his use of radiation to sterilize *Drosophila*, fruit flies. Knipling wrote to Muller; Muller's reply encouraged Knipling and his colleagues to try the technique with screwworms.

Bushland Shows Radiation Works

Following Knipling's correspondence with Muller concerning the use of radiation to sterilize screwworms in large numbers, Bushland put the idea to the test. Using x-ray equipment from a nearby Army hospital, he and D.E. Hopkins, both in Kerrville, Texas, exposed screwworm flies to radiation, discovering that the flies could be sterilized at certain doses without other serious damage. For SIT to work, screwworm flies had to be sterile but capable of competing with wild males for mates. The theories had yet to be field tested.

Screwworms Eradicated in Curacao

Preliminary sterile fly releases began in Curacao in March 1954. In August, eradication began in earnest. Within 2 months no fertile eggs could be found on the island. Sterile flies were released by the tens of thousands into January 1955, when the project was terminated. Screwworms had been eradicated from Curacao.

Eradication in Florida, 1956 - 1959

Florida's Campaign to Fund Eradication

Florida livestock producers began a grassroots campaign of the state legislature and the United States Congress to fund an eradication program. The effort was led by the Florida Cattlemen's Association and its president, J.O. Pearce. In April 1957, the state legislature appropriated $3 million for an eradication program.

Southeast Free of Screwworms

By early 1959—one year after the eradication program started and a year ahead of schedule—scientists claimed success in Florida and the Southeast United States. There were setbacks, however: quarantine regulations were hard to enforce and small reinfestation were reported in Florida, southern Alabama, and Louisiana. The infested areas were quickly saturated with flies, and the outbreaks were successfully controlled.

Over wintering screwworms eliminated from Southwest, 1959 - 1969

Southwestern Ranchers Press for Action

With the effectiveness of the Sterile Insect Technique (SIT) demonstrated so dramatically in Florida, livestock producers in the southwestern United States began to press for an eradication program. Charles Stewart, secretary-general manager of the Texas and Southwestern Cattle Raisers Association, wrote to Knipling in 1958 for help in beginning an eradication program there. Knipling replied that Texas and the other southwestern states would not be free from screwworms until Mexico was also free of the pest.

Southwest Animal Health Research Foundation Joins the Fight

To promote public and private support for SIT eradication of the screwworm in the West, ranchers formed the nonprofit Southwest Animal Health Research Foundation (SWAHRF), in 1961. SWAHRF raised over $1.8 million by the end of 1962 for the construction of sterile fly-production facilities. State and federal appropriations followed. In all, SWAHRF raised over $3 million for the support of ongoing eradication efforts in the Southwest.

A sterile fly production plant was constructed near Mission, Texas, financed in part with funds donated by cattle producers through the Southwest Animal Health Research Foundation (SWAHRF). The plant was capable of producing more than 150 million sterile flies per week for dispersal over infested areas of Texas, New Mexico, Arkansas, Louisiana, and Oklahoma. The program was later extended to include Arizona, California, and, based on an agreement between Mexico and the United States, the northern states of Mexico.

The United States and Mexico Agree to Fight the Screwworm Together

By 1963, researchers discovered that screwworm flies could fly distances of up to 180 miles. This meant that none of the southwestern states could be free of screwworms until the pests were eradicated in Mexico. In 1965, following an outbreak in the Southwest, Mexican and U.S. livestock producers signed a declaration asking for the establishment of a joint program for the eradication of the screwworm from the states on either side of the Mexico-U.S. border.

The United States Officially Declared Free of Screwworms

The United States was declared officially free of indigenous screwworms in 1966. By that year the Mission facility was producing up to 150 million sterile flies per week. U.S. livestock was still vulnerable to reinfestation from screwworms migrating from areas in Mexico that had not been eradicated.

The Barrier Zone Between the United States and Mexico

Once the United States was free of self-sustaining screwworm populations, a barrier zone was established between Mexico and the United States by releasing sterile male flies in northern Mexico, primarily in the border areas. Releasing the flies deterred the buildup of the natural screwworm population along the Mexico and United States border.

1972: Worst U.S. Outbreak

In 1972, the United States experienced its worst outbreak of screwworm cases since 1966. California, Arizona, New Mexico, Texas, Oklahoma, and Arkansas reported screwworm-infested livestock. Texas alone confirmed 90,000 cases, after reporting 444 in 1971.

Joint Mexico-United States Screwworm Eradication Commission Established

The outbreak spurred U.S. Secretary of Agriculture Earl Butz and Mexican Secretary of Agriculture Manuel Bernardo Aguirre to sign an international agreement on August 28, 1972, establishing a joint Mexico-United States Screwworm Eradication Commission. The agreement called for screwworm eradication in a much larger portion of Mexico than previously planned and moved the barrier zone from the United States-Mexican border, which was hundreds of miles wide and deep, to the narrowest point in Mexico—the Isthmus of Tehuantepec at the 93rd meridian.

At the height of the program in Mexico in 1983-1984, the plant produced more than 500 million sterile flies per week with a total Tuxtla work force of 2000 employees. During this period, the total number of Commission employees including the Tuxtla plant, five regional offices, quarantine stations, and Mexico City headquarters was about 2,600.

Screwworms Eradicated North and West of the 93rd Meridian in Mexico

The public education campaign played a critical role in the final eradication of screwworms north and west of the 93rd meridian at the Isthmus of Tehuantepec, the goal set by the 1972 agreement. The constant release of sterile flies in the zone, along with inspection stations that prevented infested livestock from reaching screwworm-free areas, maintained the barrier zone. In 1986, no outbreaks were reported north of the barrier zone. The goals of the 1972 International Agreement had been achieved.

Expansion into Central America, 1980s – 1990s

Extending Eradication

As eradication to the 93rd meridian proceeded, screwworm researchers and eradicators looked ahead. In 1985, entomologists proposed establishing a more feasible barrier zone; rather than splitting Mexico along

the Isthmus of Tehuantepec, a barrier along a narrower isthmus farther south would be easier and cheaper to maintain.

In 1986, the agreement between the United States and Mexico was amended to extend the program to the rest of Mexico and to authorize the cooperation with other program of Central America and Panama to eradicate Screwworms from those countries. In December 1986, the Commission signed an agreement with the Government of Guatemala to extend the screwworm program.

New Goal: As Far as the Panama Canal

Plans for extending the eradication program to the remainder of Central America were in place by 1991. USDA's Animal and Plant Health Inspection Service (APHIS) concluded that the most effective and cost-efficient barrier zone would be the Darien Gap in Panama, from the Panama Canal east to the border with Columbia.

Eradication Continues in Central America

The remaining five nations of Central America—El Salvador, Honduras, Nicaragua, Costa Rica, and Panama—followed Guatemala and Belize into the eradication program. By the summer of 1995, El Salvador was screwworm free. In Central America, fly release continued long after the last case of screwworm infestation and until adjoining countries were well on the way to eradication. As of February 2000, only Costa Rica and Panama remain to be completely freed of screwworms; both countries continue with ongoing release of sterile flies. Public education efforts were essential to these accomplishments.

Permanent Barrier at the Darien Gap

Because of the distance of the fly-rearing facility in Tuxtla Gutierrez, Mexico, a new sterile fly production facility in Panama will maintain the permanent barrier zone at the Darien Gap. The new plant, to be completed by 2006, will supply sterile flies for constant release across Panama, east of the Canal.

International Cooperation

Cooperation in North Africa

When imported livestock infested North Africa with the New World screwworm in 1990, potentially endangering the livestock, wildlife, and people in Africa and the Mediterranean, USDA agencies provided advice and assistance through the United Nations Food and Agriculture Organization. A multinational team used sterile insects from the production facility in Tuxtla Gutierrez, Chiapas, Mexico.

COPEG
GENERAL INFORMATION

COPEG BACKGROUND

The Program for the Eradication of the Screwworm in Panama is part of the USDA Regional Plan that the United States Government developed for Central America. The plan is supported by each one of the countries that benefit from it. COPEG is unique and we hereby present the background of the most outstanding aspects of the Program in Panama.

1994

Signing of the Cooperative Agreement between MIDA and USDA, by which the Panama - United States Commission for the Eradication and Prevention of the Screwworm (COPEG) is created.

Plans are made to absorb the Panama-United States Commission for the Prevention of FMD (COPFA) and to use COPFA facilities by COPEG.

Panama designates an area for the construction of the Sterile Flies Production Plant in Felipillo, Pacora, and another site for the Construction of the Center for Dispersion of Sterile Flies in Tocumen International Airport.

1995

- One building in the complex of MIDA offices is made available for use as COPEG and COPFA headquarters. These offices are located in Curundu, Building 573, on Manuel R. Melo St.

1996

- The Epidemiology Surveillance Program of Vesicular Disease is implemented.

1999

- COPEG absorbs the responsibilities and personnel of COPFA.

- The Master Plan for the construction of the Sterile Fly Production Plant is revised and an order is issued to begin the Environmental Impact Study.

- The Cooperative Agreement becomes a Law in the Republic of Panama, through Law No. 13 of May 6th, 1999, which gives COPEG the status of INTERNATIONAL MISSION.

2000

- The last screwworm case in the Western Region is reported on August 20, and in the Central Region was June 11th.

- A contract is signed with the United States Southwest Animal Health Research Foundation (SWAHRF) for designing the Screwworm Production Plant. Five companies were pre-qualified to participate in presenting proposals for the environmental impact study.

2001

- Two statements of technically free areas are made, which include Chiriqui, Bocas del Toro, and the Central Provinces.

- The last case of Screwworm in the Western area of the Province of Panama was May 12 of 2001 and the last case in Western area of the Province of Colon.

2003

- Due the accidental release of fertile flies a general alert was declared against the screwworm on January 30, 2003. The campaign against this emergency was called " Operation Contention 2003". This General Alert was lifted on May 23, 2003, with 439 positive cases of Livestock Screwworm. No cases were reported west of the Canal.

- On September 25 the dispersion of sterile flies was extended, 20 nautical miles into Colombian territory, with the purpose of concluding the eradication phase of this insect in the Republic of Panama, initiated in 1998.

2004

- On February 2 started the construction of the Sterile Fly Production Plant. Parallel to that, during the whole year, bidding and public acts to complete and compel the budgetary item for such construction were done.

- Two cases of screwworm were reported on March 8 and 25, in the province of Darien (border with Colombia)

2005

- As July, two cases of SW were report, the first on April 8 and the second on June 9, both in the province of Darien (border with Colombia).

2006

- On July 12, the Sterile Fly Production Plant was inaugurated.

COPEG OBJECTIVE

The objective of the Panama-United States Commission for the Eradication and Prevention of Screwworm (COPEG) is to eradicate and subsequently prevent the reinfestation of the Screwworm on Panama's domestic animals and wild fauna, without damaging the environment; as well as planning, designing, constructing, furnishing, and operating a Sterile Fly Production Plant in Panama.

COPEG also performs the important task of surveillance for vesicular diseases and the prevention of foot and mouth disease, this last one being of special importance, due to the fact that the disease does not exist either in North or Central America. The Commission activities are key in preventing its entry into the region.

The impact of COPEG's actions will have a positive effect on the health of the human population, the wild animal population, as well as on cattle production, raising the levels of quality, and improving the prices of animal products and by products to consumers.

The financial benefits for the Panamanian producer have been estimated of 12 million (USD) of dollars per year, manifested in an increase in cattle production in beef, milk, and leather, as well as the decrease in animal deaths, and savings in insecticides, veterinary services, labor, inspection, and handling of animals.

COPEG MISSION

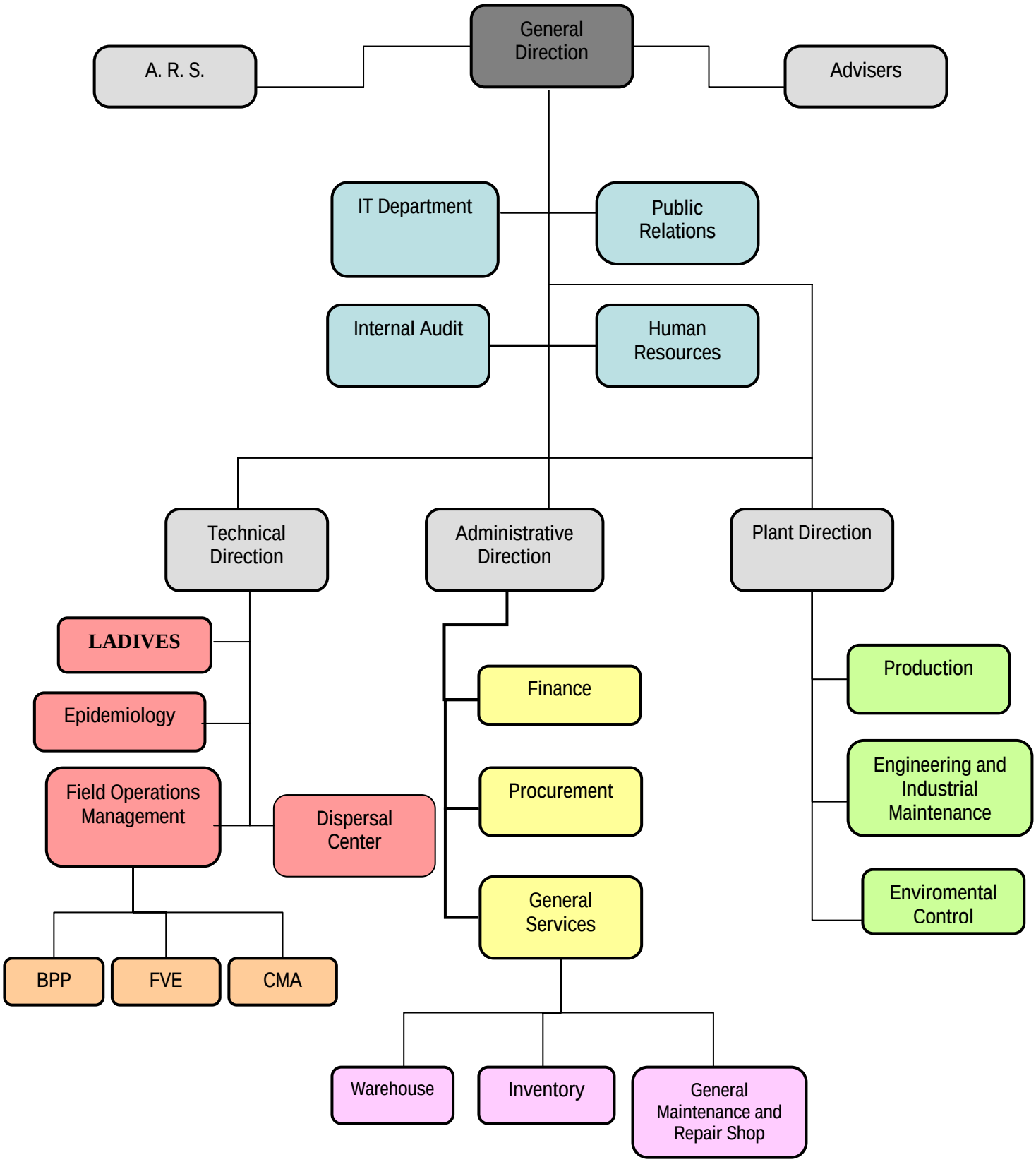
Safeguard the health and animal production of the Central and North American Region, through the implementation of a permanent barrier against the screwworm and foot and mouth disease; through: field eradication operations and prevention, epidemiological surveillance, diagnosis of vesicular diseases and dispersal of screwworm sterile flies.

COPEG VISION

A specialized service organization at national and international level assuring animal health through:

- Epidemiological surveillance diagnosis of vesicular diseases and other exotic diseases.
- Production and dispersion of sterile flies.
- Technical consultancy for the development of eradication and prevention models of screwworms and other diseases.
- Basic investigation applied on diseases in collaboration with universities and national and international research centers.

COPEG ORGANIZATIONAL CHART



COPEG
DISPERSAL CENTER

STERILE FLY DISPERSAL CENTER
CENTRO DE DISPERSIÓN DE MOSCAS ESTÉRILES

PROCEDURE OF ACTIVITIES IN THE DISPERSAL CENTER

COPEG's General Direction ask the supplier (Sterile Insect Production Plant located in Mexico) to supply the sterile flies in the Republic of Panama.

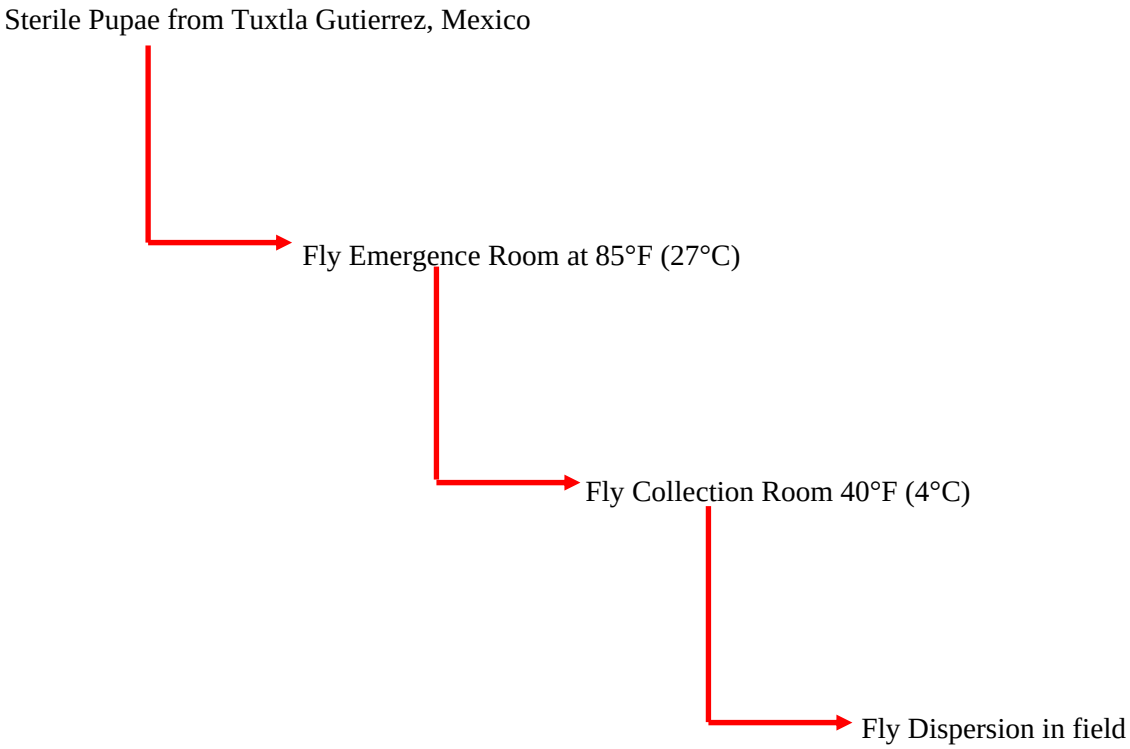
The shipment with sterile material arrives on Tuesday and Saturday from Mexico by air, through an USDA contract with Dynamic Aviation.

The sterile pupaes are received in the Dispersal Center in Tocumen from Tuxtla Gutierrez, Mexico by air after 5 hours of flight.

The pupae are taken to special rooms held at 85°F and allowed to emerge. Once emerged, the flies are attracted by light to a "chill" room held at 40°F where they become immobile.

When enough flies are collected they are placed in dispersal aircraft and released.

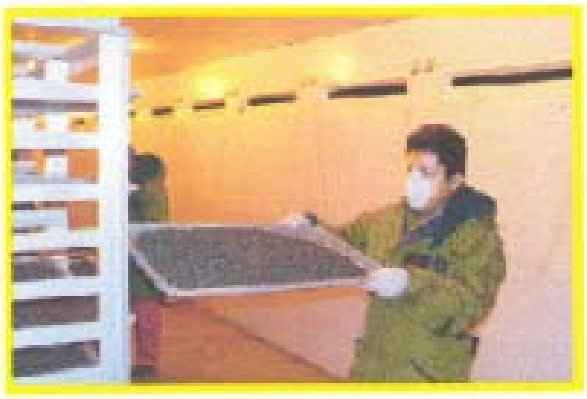
SEQUENCES OF EVENTS AT FLY CENTER



ACTIVITIES OF THE STERILE FLY DISPERSAL CENTER IN PANAMA

1. The sterile pupa of SW arrive in Panama from the Plant in Mexico.

2. The trays are placed in the Dark Chamber for their emergence. Temperature of 85°F or 26°C with 50% of relative humidity.



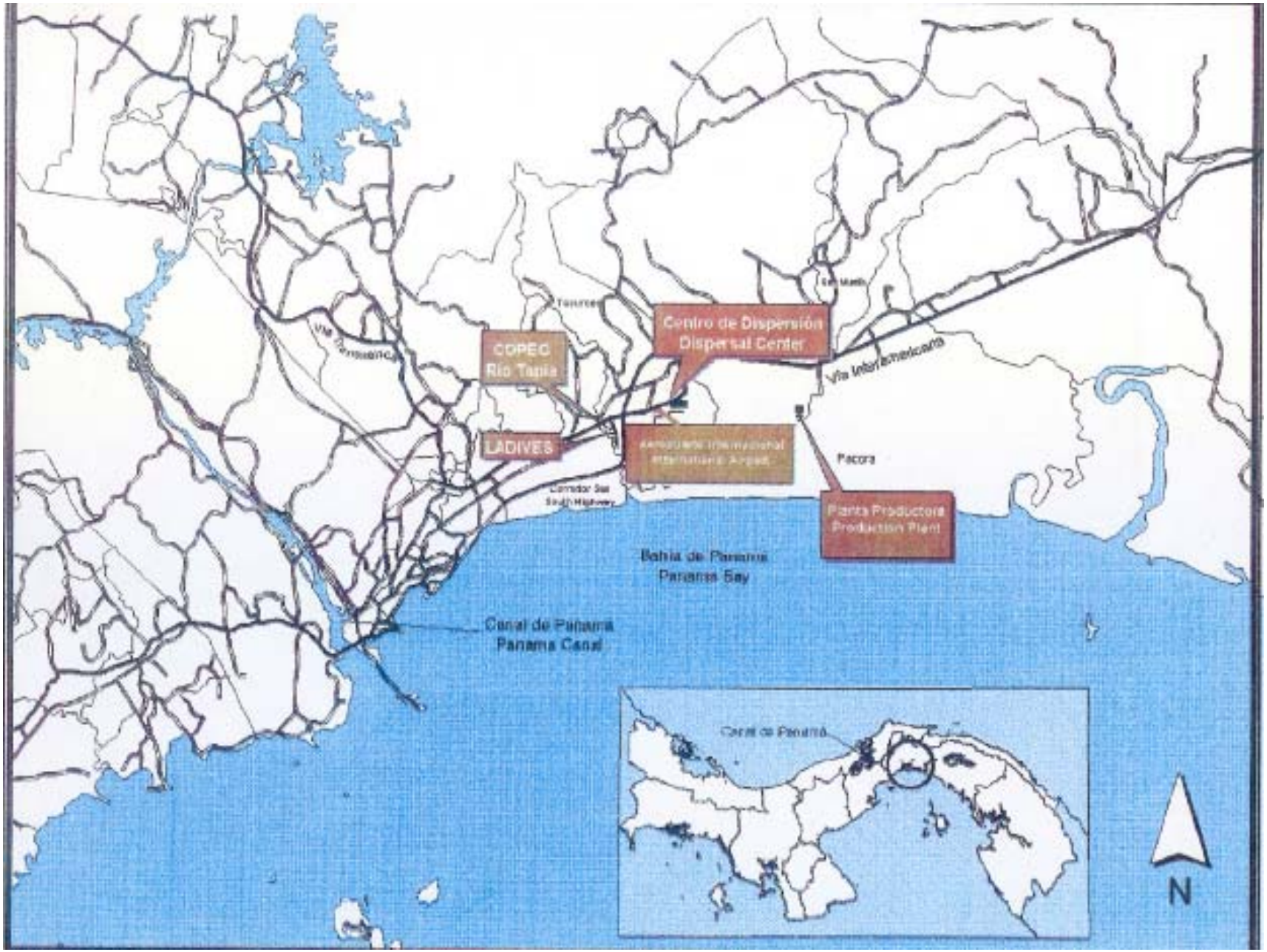
3. In the Light Chamber they adults are anestetized by the cold for their manipulation. Temperature of 40°F or 4°C with 50% of relative humidity is used.

4. Containers with anestetized flies are filled.

5. Transportation of containers to the dispersal plane.

6. Take off of the plane to start dispersion.

STERILE FLY PRODUCTION PLANT


COPEC
Río Tapia
LADIVES
Centro de Dispersión
Dispersal Center
Vía Interamericana
Pacora
Planta Productora
Production Plant
Bahía de Panamá
Panama Bay
Canal de Panamá
Panama Canal
N

SCREWWORM STERILIZATION FACILITY
PACORA, REPUBLIC OF PANAMA
CONSTRUCTION INFORMATION

The property is 85 hectares in total, located outside Pacora, on the site of a former sugar mill. COPEG is currently using 18-20 hectares. There are nine buildings on the jobsite; each of these buildings requires the efforts of one or more contractors. The work has been subdivided into either general construction or specialized construction. Some of the contractors are working in one or more of the buildings.

A summary of the buildings and the work by building and Contractor is as follows:

1. **The Production Building**, Its utility is to raise and sterilize flies (in their pupae phase). For this purpose there will be a level III biosecurity area, where the fertile insects will be handle. This building is approximately 10,000 square meters (sm) in area and is constructed utilizing the "Tilt-up Wall" method of construction. This construction method is used more commonly in the US, but has not been attempted on this scale in Panama before this project.

   The Utility Building, Is the area where all of the power, steam and cold water is generated to make work the Production building and will be conducted through pipes. It is also constructed with the 'Tilt-up Wall" method. This building is approximately 1000 sm.

2. **The Administration Building** will house all the clerical and administrative personnel. This two-story building is approximately 3,000 square meters and is constructed with a variety of techniques "Tilt-up Wall", some poured in place concrete and some masonry block. It will have facility for handicapped persons.

3. **Warehouses**: These warehouses were part of the original sugar mill operations. Both are approximately 3,000 square meters.

   The North Warehouse has been totally renovated and will be used for the treatment of potable water and waste, using an innovative system brought from Canada, for which Panamanian personnel will be trained. The South Warehouse will be used primarily for storage and maintenance of equipment.

   The South Warehouse will be used for storage and maintenance of equipment.

4. **The Security Building and its two Guard Houses:** The security building is located next to the guardhouse at the front main entrance to the property. It is approximately 800 square meters and is constructed with normal block walls. It will house the security operations for the facility. All employees and visitors will pass through this building as they enter and leave the property. The guardhouses are one at each of the gated entrances, will be the checkpoints for entrance to the facility. Each building is approximately 25 sm..

5. **The Agricultural Research Service Lab** is approximately 500 square meters.

The project has a $40 Million USD budget. Since the start of the project, prices for many building supplies, such as concrete, steel and oil-related items, have risen. However, we are currently running below budget.

The project is scheduled to be completed by the second quarter of 2006. A phased start-up of the facility is planned to run through the end of 2006.

Construction Management (CM) is being performed by McKinney and Company, of Ashland, Virginia, working through its Panamanian office (McKinney International). Construction management includes the supervision of all contractors on the site, coordination of the schedule of the project, inspection of the work of the contractors and oversight on the cost of construction. McKinney serves as COPEG's field manager to oversee the completion of the project.

There are sixteen (16) Panamanian contractors working onsite, employing between 200-250 workers. Approximately 25% of the workforce comes from Pacora or the surrounding area.

The buildings were designed to comply with the International Building Code of 2000 (IBC 2000). This is the strictest international construction code. Under the design criteria applied here, the site is considered to be in a "minor earthquake" zone. As a result, the structural design of these buildings requires much more reinforcement and structural integrity than would typically be found. For example, the Production Building actually rests on over 250 caissons, each at least 1 meter in diameter and up to 7 meters deep. Additional reinforcing has been included in all the concrete structures.

McKinney designers have applied the most stringent requirements for health and safety aspects of the building design. US standards for fire protection and environmental regulations were utilized. Current US standards for access for disabled persons were also used. During the construction phase, McKinney is enforcing strict application of safety and health standards for workers on the job. Fall protection, hard-hat and safety eyewear usage, confined space entry procedures and protection of workers in trenches have all been applied.

COPEG is also utilizing the services of independent testing agencies to monitor the quality of concrete and other materials used onsite. Separate inspections are performed on the construction processes, particularly concrete placement and welding of structural components.

This project also includes some innovative ideas. For example, the Production and Utility Buildings are built with concrete panels that were cast on the ground and lifted into place. This "Tilt-up Wall" method has not been attempted on this scale in Panama. Our concrete contractor developed the skills needed to perfect this technique during this project.

One of the most critical elements of the project is the construction of treatment facilities for water and waste. COPEG committed to include these operations in the project from the beginning. Drinking water for the site will be obtained from several wells located on the property. The water will be piped from the wells to the North Warehouse where it will be treated to meet US drinking water standards. The clean water will be piped to a 1 million gallon holding tank for storage. This tank will supply the needs for drinking and process water. In addition, it provides water for the fire protection systems contained in each building.

All waste products generated on the site (from toilets, wash-down of equipment, mop water, etc) will be collected and directed to the North Warehouse. Through a series of separators, chlorinators and storage tanks, the waste will be neutralized and extracted. What will remain is clean water that meets all US-Environmental Protection Agency guidelines. This clean waste stream is actually cleaner than the river adjacent to the property where it will be discharged.

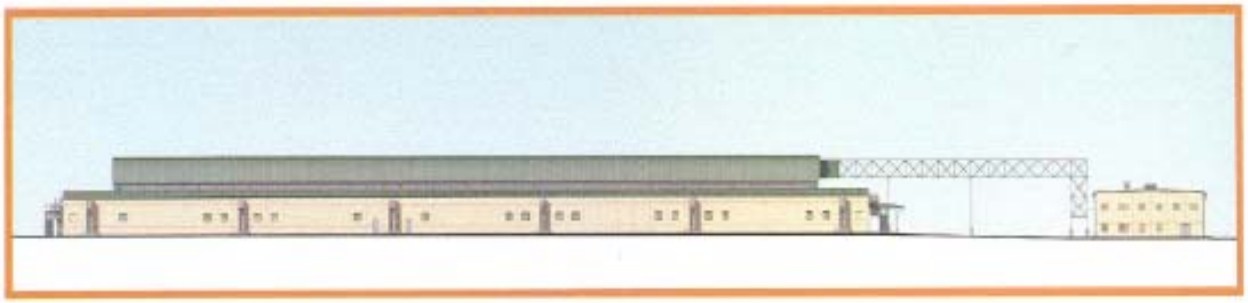
A sophisticated security system will be in place to provide a safe working environment for all. COPEG intends to utilize high tech controls within the buildings to monitor their production processes.

We believe that the contractors on this project have done a fine job. McKinney and COPEG have expected high quality workmanship and adherence to very strict requirements. In some cases, the requirements may have been more than they expected when they started. But each of them has performed as required and most have gained valuable knowledge of new construction techniques and safety requirements. All of them will be better contractors for participating on this project.

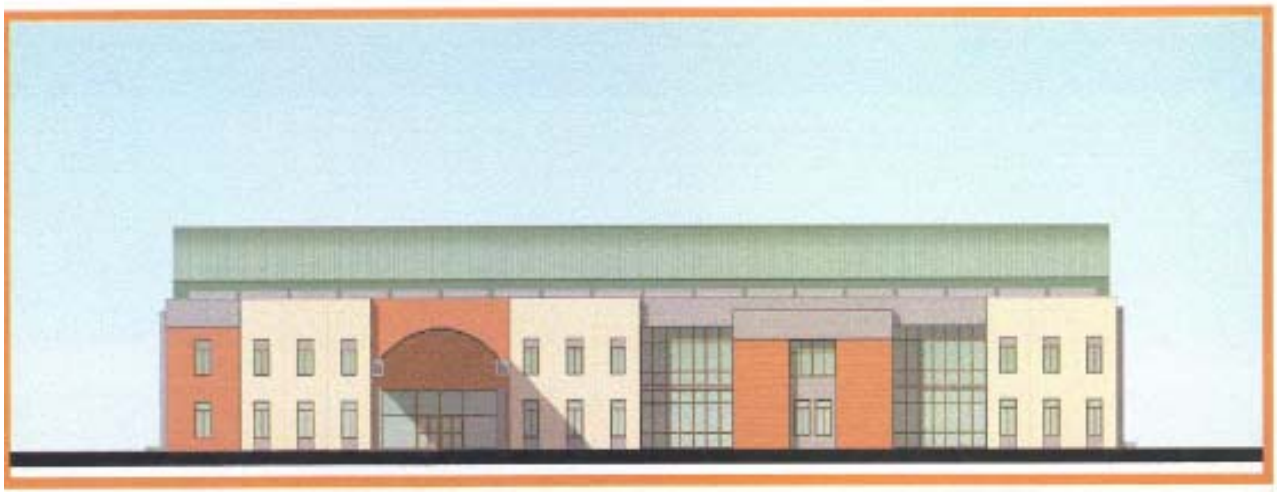
In summary, COPEG and McKinney are building a state-of-the-art complex that will stand for generations. This facility will provide jobs for the people of this area for years to come.

STERILE FLY PRODUCTION PLANT - DESIGN
DISEÑO - PLANTA PRODUCTORA

PRODUCTION AND UTILITY BUILDINGS
EDIFICIOS DE PRODUCCIÓN Y UTILIDADES



ADMINISTRATION BUILDING
EDIFICIO DE ADMINISTRACIÓN



AGRICULTURAL RESEARCH SERVICE

SCREWWORM RESEARCH UNIT

Briefing on Research by the USDA-ARS Screwworm Research Unit
Prepared by Steven R. Skoda

Issue:
The Screwworm Research Unit (SRU) has had personnel located in several locations, in different countries, for the past 10 years: personnel have been conducting research in Panama for about 10 years. Over the next 2 years, as the permanent laboratory is completed in the facility near Pacora, SRU plans to concentrate all of its personnel and research in Panama.

Background:
Screwworms are devastating pests of domestic and wild animals, including humans, because the larval stages (i.e. maggots) are obligate parasites feeding on living tissues. They cause severe economic and health consequences, including death, to their hosts. Screwworm has been eradicated from the U.S., Mexico, and most of Central America to the Darien of Panama: continued successful exclusion of screwworms from the U.S. relies on continued success of the Sterile Insect Technique (SIT) used by eradication programs. The eradication programs have remained successful by relying on and using up-to-date knowledge provided from SRU research of population biology, rearing technology, identification capabilities, and surveillance techniques.

The objectives of the SRU are to provide basic and applied research that supports the international eradication programs and directly benefits the SIT. Current research includes: 1) identifying and applying technology, including transgenic techniques (involving Genetically Modified Organisms – addressed separately), useful towards developing male-only strains of screwworms; 2) determining the extent of association between screwworms and viruses causing highly contagious animal diseases (i.e. Foot and Mouth Disease) that provides confidence when developing new strains for mass production; 3) developing new or improved diets, rearing methods and production process for mass production of screwworms; 4) adapting and optimizing molecular genetic techniques useful in identifying all life-stages of the screwworm and evaluating which techniques are useful for identifying geographic origin of samples; 5) using GIS modeling and remote sensing to determine sterile screwworm dispersal, longevity and habitat use; and 6) developing a mathematical model, based on diffusion theory, of screwworm dispersal useful in determining the spread of outbreaks and optimizing parameters for releasing sterile screwworms. Also, SRU responds to specific request by our customers including: developing new strains of screwworms for use in the mass rearing facility; identification of suspicious samples; testing new equipment (radiation devices to sterilize flies, new delivery mechanisms for sterile flies, etc.); responding to outbreak situations or areas where screwworm eradication is proving difficult.

Requested Action:
Solely that the Department of State as well as the Government of Panama be aware of the upcoming concentration in Panama of personnel and research by the USDA-ARS Screwworm Research Unit.

FOOT AND MOUTH DISEASE INFORMATION

DATA SHEET: FOOT AND MOUTH DISEASE

DESCRIPTION:
Foot and Mouth Disease (FMD) is one of the most feared disease that can affect livestock. It is caused by an Enterovirus of the FMD group: Type A, O, and C, South African Type 1, 2, 3, Asia Type. More than 65 subtypes have been identified. FMD infects all cloven-hoof animals. The typical symptoms of this disease are: fever, vesicles and erosions on the epithelium of the mouth, nostrils, muzzle, hooves, teats, and udder.

BACKGROUND:
FMD was identified in Europe in the early 1540s. In 1865, the disease entered South America for the first time, through Argentina, with cattle imported from Europe. In 1871, it spread from Argentina to Brazil, Chile, and Uruguay.

The disease continued expanding within the four affected countries, but did not spread to other countries until 1910, when an epidemic took place in Peru, Bolivia, and Paraguay. In 1946, the disease appeared in Mexico, but it was eradicated in 1954. In 1952, an isolated case appeared in Canada, but was rapidly detected and eradicated.

In March of 1950, forty years after the epidemics in Peru, Bolivia, and Paraguay, FMD appeared for the first time in Venezuela. In December of the same year, the first FMD epidemics appeared in northeast Colombia. Despite control measures, FMD spread throughout Colombia for 10 years. In 1961, the first FMD epidemic that came from Colombia took place in the North of Ecuador, and spread throughout the country for five years. However, it did not spread from Colombia to Panama or Central America.

The border area between Colombia and Panama, with its marshes, mountains, and forests, turned out to be an effective barrier against the spread. This situation has remained for nearly four decades thanks to technical activities developed with the support from Panama, USDA and OIRSA.

DIAGNOSIS:
FMD cannot be diagnosed accurately in the field. It can be mistaken for other diseases, such as stomatitis. Due to the fact that vesicular stomatitis is present in North, Central, and South America, differential diagnosis is a big issue. Because of this, vesicular samples are sent to an approved laboratory for the diagnosis of diseases.

CONTROL:
If FMD is identified in a country the movement of animals must be controlled to prevent the spread of the disease. Animals that recover can become carriers of the virus for a long time period. Likewise, it is necessary to take precautions with other animals, transportation equipment, and even persons who could carry the FMD virus.

Vaccines can be used to prevent the spread of FMD, but they need to be prepared with the same type of virus and subtype to be effective. Protection provided by the vaccines is relatively short-lived, so it is necessary to repeat its application regularly (every six months). In some countries to eradicate FMD large numbers of animals may be sacrificed, as was the case in England several years ago.

ECONOMY:
FMD is a disease that has a huge impact in livestock production, which causes the highest damage on animal production. Infected animals take months to recover and some of them never do. Countries that are FMD-free and even infected countries prohibit the import of high-risk animals, animal products and byproducts coming from FMD-infected countries. FMD can have an adverse impact in global trade.